Product Specification

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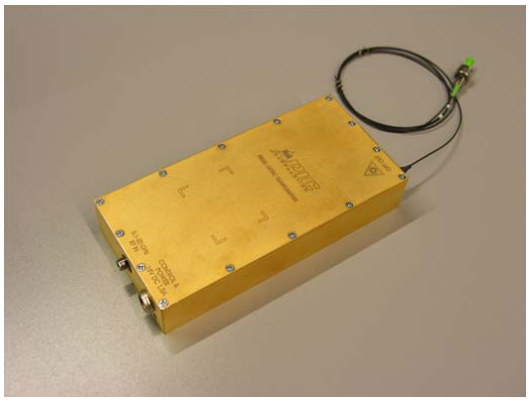
Miniature, Ruggedized 20 GHz RF over Fiber Transmitter

Part #MicroATX-BW-L-FL-FC

PRODUCT FEATURES

- Bandwidth: 0.05 to 20 GHz (with LNA); DC to 20 GHz (no LNA)
- Output Power >11.8 dBm (15 mW)
- Noise Figure <8 dB (with LNA); <22 dB (without LNA) at 10 GHz
- High Linearity, Dynamic Range, and RF Saturation
- Fully integrated module with all electronics and optical components
- MIL-STD tested for temperature, shock, vibration, barometric pressure, and EMI



APPLICATIONS

- Broad band RF over fiber – distances up to 10 km
- Antenna remoting for wireless systems, electronic sensors, and networks
- Linear, robust, and compact fiber links for next-generation (e.g. 5 G) wireless and data communications
- High frequency phase interferometry RF systems

DESCRIPTION

This product is a miniature, ruggedized 20 GHz analog RF over Fiber (RFoF) optical transmitter which is part of a high performance solution for RF remoting. It is a self-contained, compact module that includes ultra-low noise driver electronics, low RIN laser with shot noise performance, high performance modulator, and optional LNA. The transmitter is set for automatic turn-on upon power-up or controlled through a built-in GUI that enables the user to control all internal components (i.e. laser, modulator, and LNA operating parameters). The transmitter offers 50 MHz-20 GHz RF instantaneous bandwidth which, when coupled with APIC's high responsivity and linearity receivers, offers unmatched RFoF link performance.

For applications that require high sensitivity and very low minimum detection signal threshold, use of the optional LNA is recommended. For applications that require higher linearity, the no-LNA option is recommended.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Minimum	Maximum	Units	Condition/Comments
Storage Temperature		-55	85	°C	
Operating Temperature		-40	75	°C	
Maximum RF Input Power	P_{RF}		10	dBm	With LNA installed
			26	dBm	Without LNA
Operating Voltage	V_{CC}	14	16	V	
Operating Current	I_{CC}		1	A	
ESD			±500	V	

OPTICAL AND ELECTRICAL SPECIFICATIONS

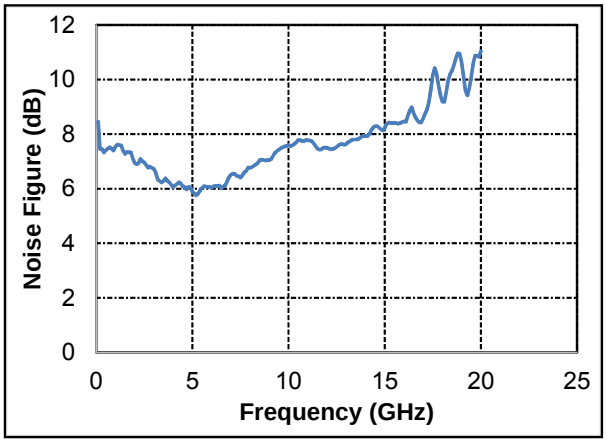
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
Operational Wavelength	λ	1530		1565	nm	Factory ordered at selected ITU wavelengths
Optical Output Power		15	20		mW	$I=I_{op}$, Modulator at quadrature
Output power flatness	P_{flat}	-0.5		0.5	dB	Over full temperature range; Modulator at quadrature
Laser Linewidth			250	500	KHz	At Factory Setting, no modulation
Relative Intensity Noise	RIN		-168	-165	dB/Hz	Over 50 MHz to 20 GHz at $I=I_{op}$
Side Mode Suppression	SMSR	40	50		dB	At Factory Setting
Laser Threshold Current	I_{th}		13	16	mA	At room temperature
Laser Operating Current	I_{op}		500	550	mA	CW operation
Optical Return Loss	ORL	30	45		dB	

RF SPECIFICATIONS—with LNA

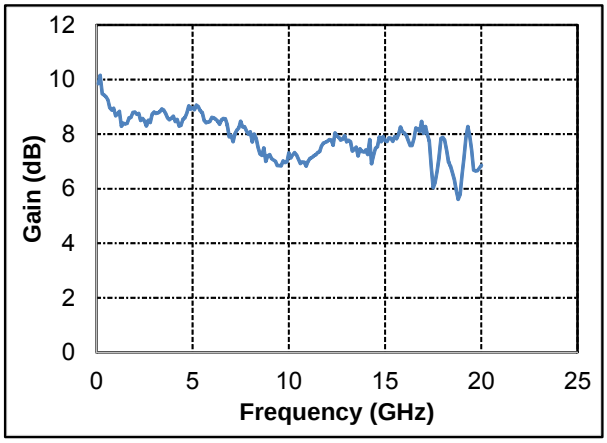
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
RF Bandwidth	f_{3dB}	18	20		GHz	3 dB RF roll off
RF Gain at 10GHz	G	6	7		dB	
Noise Figure	NF		8	9	dB	At 10 GHz, with APIC ARX
Spur-Free Dynamic Range	SFDR	112	114		$dB/Hz^{2/3}$	At 10 GHz, with APIC ARX
Third Order Intercept Point	IIP3	2.5	3		dBm	At 10 GHz, with APIC ARX
Second Order Intercept Point	IIP2	25	30		dBm	At 2 GHz, with APIC ARX
1 dB Compression Point	P1dB	-7	-3		dB	At 10GHz
Phase Stability	PS		1	2	deg	Measured over 1 Hour at 10 GHz
Return Loss	S_{11}		10		dB	From 50 MHz to 20 GHz

RF SPECIFICATIONS – No LNA

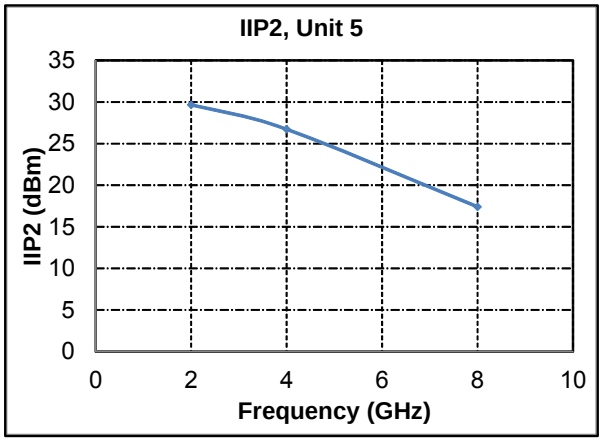
Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
RF Bandwidth	f_{3dB}	18	20		GHz	3 dB RF roll off
RF Gain at 10 GHz	G	-10	-8		dB	
Noise Figure	NF		22	23	dB	At 10 GHz, with APIC ARX
Spur-Free Dynamic Range	SFDR	113	114		$dB/Hz^{2/3}$	At 10 GHz, with APIC ARX
Third Order Intercept Point	IIP3	19	20		dBm	At 10 GHz, with APIC ARX
Second Order Intercept Point	IIP2	46	53		dBm	At 2 GHz with APIC ARX
1 dB Compression Point	P1dB	11	12		dB	At 10 GHz with APIC ARX
Phase Stability	PS		1	2	deg	Measured over 1 Hour at 10 GHz
Return Loss	S_{11}		10		dB	From DC to 20 GHz

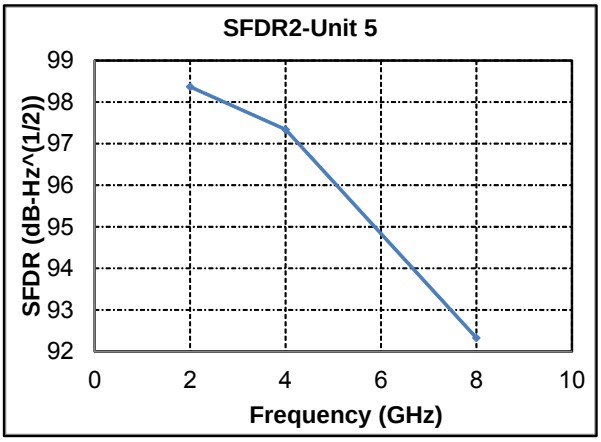


Noise Figure, Micro ATX with LNA

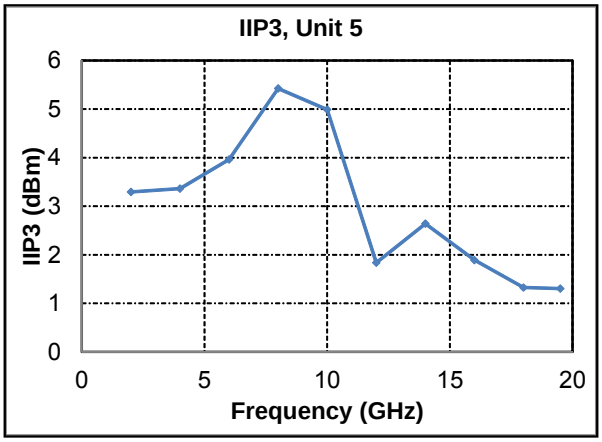


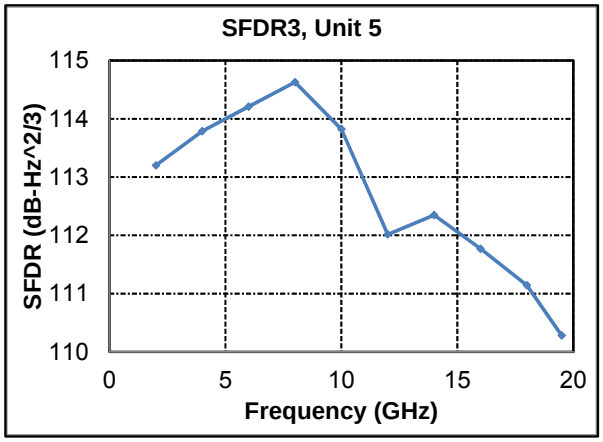
Gain, Micro ATX with LNA





IIP2 and SFDR2 for Micro ATX, with LNA





IIP3 and SFDR3 for Micro ATX, with LNA

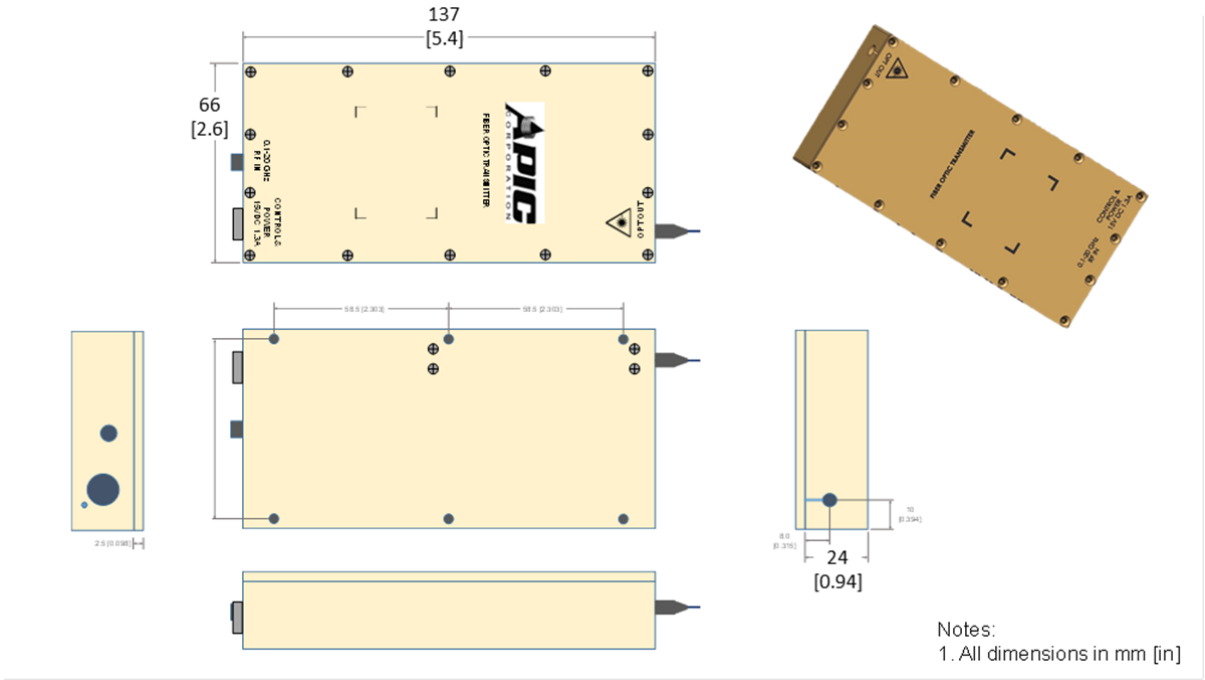
MECHANICAL SPECIFICATIONS

Parameter	Symbol	Minimum	Maximum	Units	Condition/Comments
Height	H		24	mm	
Length	L		137	mm	Not Including Snout
Width	W		66	mm	
RF Connector					SMA (Female)
Electrical Connector Type (Power)					2.1mm ID /5.5mm OD, for 15 V, 1 A DC Source
Package Heat Flow					Package Base
Fiber Pigtail Length		0.93		m	Single-Mode, Polarization-Maintaining Fiber
Pigtail Termination					FC/APC

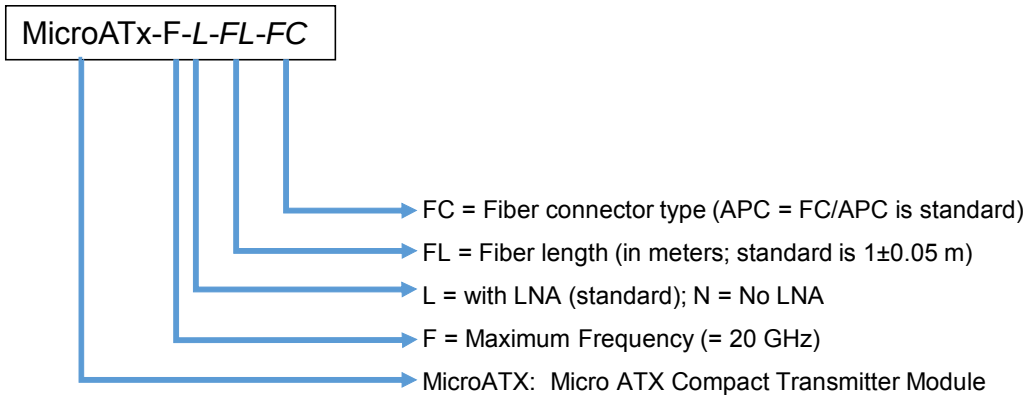
ENVIRONMENTAL SPECIFICATIONS (Preliminary, Qualification in Progress)

Parameter	Minimum	Maximum	Units	Condition/Comments
Operating Temperature	-40	+70	°C	Case temperature
Storage Temperature	-40	+85	°C	
Operating Humidity	0	80	% RH	
Shock	20 G amplitude, 11 ms duration, 3 shocks each axis and each direction		G	MIL-STD-810G, Method 516.6, Procedure I, Operational
Operational Vibration	3.56 Grms one hour each axis		Grms	MIL-STD-810 Method 514.6, Category 12
Endurance Vibration	8.25 Grms one hour each axis		Grms	MIL-STD-810 Method 514.6, Category 12
Barometric Pressure	0.11	2.0	atm	Up to 50,000 ft. equivalent
Radiated Emission (EMI), Electrical	24	70	dBμV/m	MIL-STD-461G, RE102, 10 KHz to 26.5 GHz
Radiated Emission (EMI), Magnetic	30	110	dBpT	MIL-STD-461G, RE101, 30 Hz to 100 KHz
Radiated Susceptibility (Electrical)	200		V/m	MIL-STD-461G, RS103, from 10 KHz to 40 GHz
Radiated Susceptibility (Magnetic)	130	180	dBpT	MIL-STD-461G, RS101, from 30 Hz to 100 KHz
Reliability Performance	40,000		hours	

MECHANICAL DRAWING



ORDERING INFORMATION



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